Remarks

The present Response is to the Office Action mailed 11/04/2008. Claims 1-15 are presented for examination.

Claim Rejections - 35 USC § 103

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 7,039,720 to Alfieri et al. (hereinafter "Alfieri") in view of US Patent No. 5,528,513 to Vaitzblit et al. (hereinafter "Vaitzblit")

Regarding claim 1, Alfieri teaches an edge router operating Border Gateway Protocol (BGP) in a packet network **[Figs. 1 & 5; Edge Routers 14 operating BGP in Wide Area Routed Network 10; col. 3, lines 8-22, col. 5, lines 28-30]** comprising:

a processor resource for processing events **[Fig. 5; multiple tasks 60 timeshare the same physical processor in the Router 14 for processing task events; col. 6, lines 8-25];**

at least one scheduler **[Fig. 5; A context selection logic 64 is a task scheduler for scheduling tasks 60]** managing all events for processing by the processor resource **[Fig. 5; The time-sharing is accomplished in part via the context selection logic 64. As events occur that require action for a given VR, the context selection logic 64 couples the appropriate task 60 to the context area CTXT for that VR. The task 60 then executes using the data from that context area CTXT; col. 5, lines 35-43, col. 6, lines 30-36].**

Alfieri does not expressly teach the edge router comprises one ready list; and individual event pipelines dedicated to individual ones of BGP peers; wherein events received for processing are posted in their associated event pipelines according to the source of the events, pipelines having events to be processed insert a flag in the ready list, and the scheduler repetitively scans the ready list sequentially, and releases events to the processor resource with preset limitation per pipeline.

Vaitzblit teaches a scheduler with a weighted round-robin scheduling schemes in a network **device [Figs. 1-2; a Video File Server 20 having a Scheduler 53; col. 3, line 17]**, comprising:

at least one ready list [**Fig. 2; a block of scheduling flags 142; col. 4, lines 6-7**]; and

individual event pipelines dedicated to individual ones of peers **[Fig. 2; e.g. a first and a second network interface queues 130 and 132 for managing each of interface peers, respectively; col. 3, lines 55-59];** wherein events received for processing are posted in their associated event pipelines according to the source of the events, pipelines having events to be processed insert a flag in the ready list **[Fig. 2; A scheduling flag is used to indicate that a task has pending work and to signal the scheduler 53 that the task needs to be invoked; col. 4, lines 6-15]**, and the scheduler repetitively scans the ready list sequentially **[Fig. 5, steps 515-520- 540-515; scan the block of scheduling flags 142 based on a round-robin algorithm, i.e. sequentially; col. 3, lines 27-28, col. 7, line 61 - col. 8, line 15]**, and releases events to the processor resource with preset limitation per pipeline [**Fig. 5, steps 540-550; yielding the processing resources once all the scheduling flags are scanned or due to the time limitation; col. 8, lines 15-17; col. 3, lines 62-67**].

Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to incorporate a scheduler with a block of scheduling flags, i.e. a ready list, to sequentially scan the pending events/tasks as taught by Vaitzblit into Alfieri's context selection logic or scheduler of the edge router, since both inventions are directed to the multiple tasks/events scheduling within a network device.

The motivation for combining the reference teachings would be to enable Alfieri's edge router to achieve improved performance *even* in a very large network with a large number of routes without involving expensive or extensive hardware or software modification.

Regarding claims 2, 7 and 12, Alfieri, in view of Vaitzblit, teaches individual ones of the BGP peers are virtual private routed networks (VPRNs) away from the packet network **[Alfieri: Fig. 1; VPRNs 1-3; col. 2, line 60 - col. 3, line 29]**.

Regarding claims 3, 8 and 13, Alfieri, in view of Vaitzblit, teaches the edge router wherein the preset limitation is a time limitation **[Vaitzblit: Fig, 2; col. 3, lines 62-67]**.

Regarding claims 4, 9 and 14, Alfieri, in view of Vaitzblit, the edge router wherein the preset limitation is a buffer limitation **[Vaitzblit: The real-time class 120 scheduling is suitable for tasks that require guaranteed throughput and bounded delay, which are obviously subjected to the buffer limitation; col. 3, lines 44-54]**.

Regarding claims 5, 10 and 15, Alfieri, in view of Vaitzblit, teaches the edge router comprising a first scheduler, a first ready list, and pipelines dedicated to events associated with both VPRNs and core BGP peers in the service provider network **[Alfieri: Fig. 1; Routers 14 in Wide Area Routed Network 10; col. 3, lines 4-29]**, wherein the pipelines associated with VPRNs communicate with the first scheduler and the first ready list **[See the rejection statements to claims 1 and 2 above]**.

Alfieri, in view of Vaitzblit, does not expressly teach the edge router comprising a second scheduler, a second ready list, and the pipelines associated with the core BGP peers communicate with the second scheduler and the second ready list.

However, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to recognize that the edge routers 14 in Alfieri may implement a second scheduler, a second ready list, and the pipelines associated with the core BGP peers communicate with the second scheduler and the second ready list in the same way just like scheduling for VPRNs 1-3 to one side of the edge routers 14. Thus, the limitations set forth in the claim 5 do not depart from the combining invention scope of Alfieri in view of Vaitzblit as recited in the rejection statements to claims 1 and 2.

Regarding claims 6 and 11, Alfieri teaches a method and a machine-readable medium having stored instructions that cause the method for processing events in Border Gateway Protocol (BGP) peering in an edge router in a packet network **[Figs. 1- 5; Edge Routers 14 operating BGP in Wide Area Routed Network 10; col. 3, lines 8 22, col. 5, lines 28-30]**, comprising acts of:

(a) placing received events associated with BGP peers in dedicated pipelines according to the BGP source **[Fig. 5; A context selection logic 64 is a task scheduler for scheduling tasks 60 (including BGP tasks) and multiple tasks 60 time-share the same physical processor in the Router 14 for processing task events; col. 5, lines 35-43]**.

Alfieri does not expressly teach: (b) flagging a ready list by individual pipelines having events ready to be processed; and (c) scanning the ready list sequentially and repeatedly by a scheduler, the scheduler sending events for each pipeline to be processed to a processing resource according to a preset limitation per pipeline.

Vaitzblit teaches a scheduler with a weighted round-robin scheduling schemes in a network **device [Figs. 1-2; a Video File Server 20 having a Scheduler 53; col. 3, line 17]** comprising steps of:

(b) flagging a ready list **[Fig. 2; a block of scheduling flags 142; col. 4, lines 6-7]** by individual pipelines having events ready to be processed **Fig. 2; e.g. a first and a second network interface queues 130 and 132 for managing each of interface pipelines to be processed; col. 3, lines 55-59**]; and

(c) scanning the ready list sequentially and repeatedly by a scheduler **[Fig. 5, steps 515-520- 540-515; scan the block of scheduling flags 142 based on a round-robin algorithm, i.e. sequentially; col. 3, lines 27-28, col. 7, line 61- col. 8, line 15]**, the scheduler sending events for each pipeline to be processed to a processing resource **[Fig. 2; A scheduling flag is used to indicate that a task has pending work and to signal the scheduler 53 that the task needs to be invoked; col. 4, lines 6-15]** according to a preset limitation per pipeline [**Figs. 2 & 5; Tasks are defined to run for a limited time before yielding control to the scheduler col. 3, lines 62-67**].

Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to incorporate a scheduler with a block of scheduling flags, i.e. a ready list, to sequentially scan the pending events/tasks as taught by Vaitzblit into Alfieri's context selection logic or scheduler of the edge router, since both inventions are directed to the multiple tasks/events scheduling within a network device.

The motivation for combining the reference teachings would be to enable Alfieri's edge router to achieve improved performance even in a very large network with a large number of routes without involving expensive or extensive hardware or software modification.

Applicant's response:

Applicant very much appreciates the Examiner's thorough examination, in particular, the detailed explanation of the art and how the art reads on applicant's claims. That said, applicant respectfully disagrees with the Examiner's interpretation of the art of Vaitzblit in relation to recited limitations of applicant's independent claim 1.

The Examiner states that Alfieri does not expressly teach the edge router comprises a ready list, and individual event pipelines dedicated to individual ones of BGP peers, wherein events received for processing are posted in their associated event pipelines according to the source of the events, pipelines having events to be processed insert a flag in the ready list, and the scheduler repetitively scans the ready list sequentially, and releases events to the processor resource with preset limitation per pipeline. The Examiner relies upon Vaitzblit to teach these limitations.

Applicant argues that Vaitzblit fails to teach, "individual event pipelines dedicated to individual ones of BGP peers; wherein events received for processing are posted in their associated event pipelines according to the source of the events" as claimed in applicant's invention. The Examiner states that network interfaces 130 and 132 of Vaitzblit are queues, which is clearly in error. Vaitzblit specifically recites:

FIG. 2 shows three real-time tasks, RT1 122, RT2 124 and RT3 126. RT1 122 and RT2 124 arrived at the server 20 through a first network interface 130 and a second network interface 132. RT2 124 is directed toward a queue 134, internal to the server 20, from which RT3 126 is emerging. (col. 3, lines 55-59)

Applicant argues that, clearly, as taught above, there is only one queue for posting real time packets in Vaitzblit, which is queue 134. There are no pipelines taught in the art of Vaitzblit for posting received packets, as claimed. Further, applicant argues that Vaitzblit fails to teach that pipelines having events to be processed insert a flag in the ready list. Vaitzblit clearly teaches:

In FIG. 2, interrupt service routine ISR1 144 sets the scheduling flag for RT2 124. Interrupt service routine ISR2 146 sets the scheduling flag for RT1 122. Real-time task RT2 124 sets the scheduling flag for RT3 126. (col. 4, lines 11-15)

As clearly evidenced in the above teaching of Vaitzblit, there is not a plurality of pipelines for posting packets taught or suggested in the art of Vaitzblit. Vaitzblit is also absent of any teaching that pipelines having events to be processed insert a flag in the ready list. The interrupt service routines ISRs 1 and 2 insert the flags as shown in the text of Vaitzblit, above. Applicant argues that the art of Vaitzblit fails to teach applicant's recited limitations of claim1, as alleged by the Examiner. Therefore, the combination of Vaitzblit and Alfieri fail to support the 103 rejection as asserted by the Examiner. Claim 1 is then patentable over the art presented by the Examiner. Claims 2-5 are patentable on their own merits, or at least as depended from a patentable claim.

Regarding claims 6 and 11, the Examiner states that Alfieri teaches placing received events associated with BGP peers in dedicated pipelines according to the BGP source [Fig. 5; A context selection logic 64 is a task scheduler for scheduling tasks 60

(including BGP tasks) and multiple tasks 60 time-share the same physical processor in the Router 14 for processing task events; col. 5, lines 35-43].

Applicant argues that Fig. 5 and the associated text in Alfieri fail to teach or suggest placing received events associated with BGP peers in dedicated pipelines according to the BGP source, as claimed. Alfieri teaches:

FIG. 5 shows the VR subsystem 54. A collection of routing processes or tasks such as OSPF tasks 60-0, BGP tasks 60-B, and RIP tasks 60-R are coupled to a memory 62 via context selection logic 64. The memory 62 is divided into a number of context areas, shown as CTXT 1, CTXT 2, ... CTXT M, for M distinct VRs. Each context area contains a routing table and other operating state information for a different VR. The tasks 60 are independent processes that are time-shared among the various VRs. (col.5, 28-36)

Applicant argues that Alfieri fails to consider the source when assigning tasks to VRs. This is done according to time sharing, not the BGP source, as claimed. Further, as previously argued on behalf of claim 1, above, Vaitzblit fails to teach a pipeline flagging a ready list by individual pipelines having events ready to be processed. The interrupt service routines ISRs 1 and 2 insert the flags.

Therefore, applicant believes claims 6 and 11 are also patentable over the art provided by the Examiner. Claims 7-10 and 12-15 are patentable on their own merits, or at least as depended from a patentable claim.

Response to Remarks

3. Applicant's Remarks with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Summary

As all of the claims, as argued above, have been shown to be patentable over the art presented by the Examiner, applicant respectfully requests reconsideration and the case be passed quickly to issue.

If any fees are due beyond fees paid with this amendment, authorization is made to deduct those fees from deposit account 50-0534. If any time extension is needed beyond any extension requested with this amendment, such extension is hereby requested.

Respectfully submitted,
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